

15W isolated DC-DC converter in DIP package,
Wide input and regulated single output



Patent Protection RoHS



FEATURES

- Wide 2:1 input voltage range
- High efficiency up to 91%
- I/O isolation test voltage 1.5k VDC
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- Operating ambient temperature range: -40°C to +105°C
- Meets CISPR32/EN55032 CLASS A, without extra components
- Industry standard pin-out

VRB2415X2YMD-15WR3 is isolated 15W DC-DC converter products with a wide 2:1 input voltage with efficiencies of up to 91%, input to output isolation is tested 1500VDC, an operating ambient temperature range of -40°C to +105°C, input under-voltage protection, output over-voltage, over-current, short-circuit protection, CISPR32/EN55032 CLASS A EMI compliant without external components, which makes them widely used in industrial control, electric power, instruments and communications applications.

Selection Guide

| Certification | Part No. | Input Voltage (VDC) | | Output | | Full Load Efficiency ^② (%) Min./Typ. | Capacitive Load (μF) Max. |
|---------------|--------------------|---------------------|--------|---------------|-----------------------|-------------------------------------------------|---------------------------|
| | | Nominal (Range) | Max. ① | Voltage (VDC) | Current(mA) Max./Min. | | |
| -- | VRB2415X2YMD-15WR3 | 24 (18-36) | 40 | 15 | 1000/0 | 89/91 | 820 |

Notes:

- ①Exceeding the maximum input voltage may cause permanent damage;
②Efficiency is measured at nominal input voltage and rated output load.

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|--------------------------------------------------|-------------|-------|--------|------|
| Input Current (full load / no-load) | Nominal input voltage | -- | 687/6 | 703/15 | mA |
| Reflected Ripple Current | Nominal input voltage | -- | 30 | -- | |
| Surge Voltage (1sec. max.) | Nominal input voltage | -0.7 | -- | 50 | VDC |
| Start-up Voltage | Nominal input voltage | -- | -- | 18 | |
| Under-voltage Protection | Nominal input voltage | 12 | 15.5 | -- | |
| Start-up Time | Nominal input voltage & constant resistance load | -- | 10 | -- | ms |
| Input Filter | | Pi filter | | | |
| Hot Plug | | Unavailable | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|-------------------------------------------------------|-----------------------------------|------|-------|--------|
| Voltage Accuracy | 0%-100% load | -- | ±1 | ±3 | % |
| Linear Regulation | Input voltage variation from low to high at full load | -- | ±0.2 | ±0.5 | |
| Load Regulation | 5%-100% load | -- | ±0.5 | ±1 | |
| Transient Recovery Time | 25% load step change, nominal input voltage | -- | 300 | 500 | μs |
| Transient Response Deviation | | -- | ±3 | ±5 | % |
| Temperature Coefficient | Full load | -- | -- | ±0.03 | %/°C |
| Ripple & Noise ^① | 20MHz bandwidth, 5%-100% load | -- | 50 | 100 | mV p-p |
| Over-voltage Protection | Input voltage range | 110 | -- | 160 | %Vo |
| Over-current Protection | | 110 | 150 | 190 | %Io |
| Short-circuit protection | | Hiccup, continuous, self-recovery | | | |

Note:①Ripple & Noise at < 5% load is 5%Vo max. The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|--------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------|------|------|---------|
| Isolation | Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max. | 1500 | -- | -- | VDC |
| | Input/output-case Electric Strength Test for 1 minute with a leakage current of 1mA max. | 1000 | -- | -- | |
| Insulation Resistance | Input-output resistance at 500VDC | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output capacitance at 100KHz/0.1V | -- | 2000 | -- | pF |
| Operating Temperature | See Fig. 1 | -40 | -- | +105 | °C |
| Storage Temperature | | -55 | -- | +125 | |
| Storage Humidity | Non-condensing | 5 | -- | 95 | %RH |
| Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds | -- | -- | +300 | °C |
| Vibration | | 10-150Hz, 5G, 0.75mm. along X, Y and Z | | | |
| Switching Frequency* | PWM mode | -- | 270 | -- | KHz |
| MTBF | MIL-HDBK-217F@25°C | 1000 | -- | -- | K hours |

Note:* Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Mechanical Specifications

| | |
|----------------|--------------------------|
| Case Material | Aluminum alloy |
| Dimensions | 25.40 × 25.40 × 11.70 mm |
| Weight | 15.0g (Typ.) |
| Cooling method | Free air convection |

Electromagnetic Compatibility (EMC)

| | | | | |
|-----------|-------|-----------------|-----------------------------------------------------------------------------------------|------------------|
| Emissions | CE | CISPR32/EN55032 | CLASS A (without external components)/ CLASS B (see Fig.3-② for recommended circuit) | |
| | RE | CISPR32/EN55032 | CLASS A (without external components)/ CLASS B (see Fig.3-② for recommended circuit) | |
| Immunity | ESD | IEC/EN61000-4-2 | Contact ±6KV, Air ±8KV | perf. Criteria B |
| | RS | IEC/EN61000-4-3 | 10V/m | perf. Criteria A |
| | EFT | IEC/EN61000-4-4 | ±2KV (see Fig.3-① for recommended circuit) | perf. Criteria A |
| | Surge | IEC/EN61000-4-5 | line to line ±2KV (see Fig.3-① for recommended circuit) | perf. Criteria B |
| | CS | IEC/EN61000-4-6 | 3 Vr.m.s | perf. Criteria A |

Typical Characteristic Curve

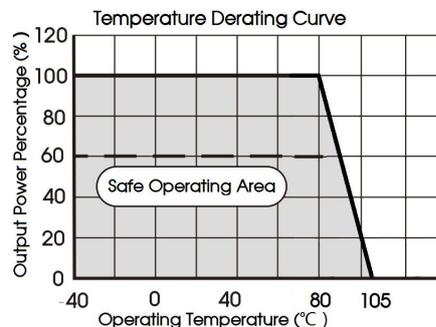


Fig. 1

Design Reference

1. Typical application

All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.



Fig. 2

| | | |
|----------|-----------------|-----------------|
| V_{in} | C_{in} | C_{out} |
| 24VDC | 100 μ F/50V | 100 μ F/50V |

2. EMC compliance circuit

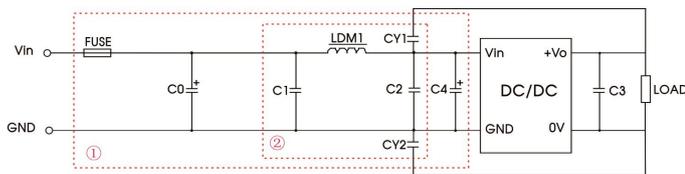


Fig. 3

Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

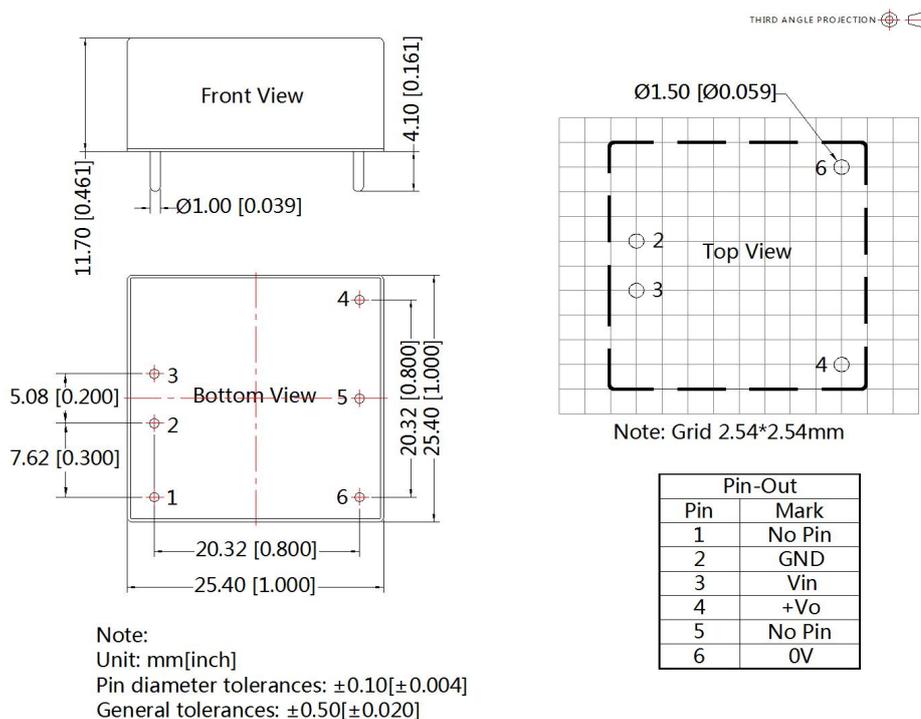
Parameter description:

| | |
|---------|-----------------------------------------------------|
| Model | V_{in} :24VDC |
| FUSE | Select fuse value according to actual input current |
| C0/C4 | 330 μ F/50V |
| C1/C2 | 4.7 μ F/50V |
| C3 | Refer to the C_{out} in Fig.2 |
| LDM1 | 2.2mH/4A |
| CY1/CY2 | 1nF/2KV |

3. The products do not support parallel connection of their output

4. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number : 58210003;
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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